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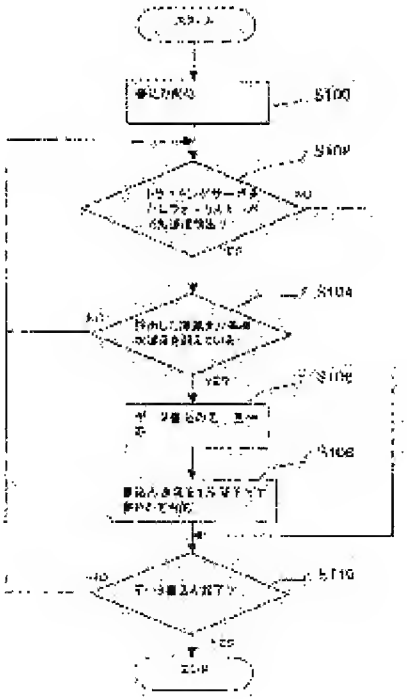
(54) METHOD FOR WRITING DATA TO OPTICAL DISK AND OPTICAL DISK DRIVE

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent a write error by detecting acceleration that occurs an optical disk during writing data in real time and controlling a writing speed on the basis of the detected state.

SOLUTION: When data is written to an optical disk 10, acceleration applied to tracking servo means 40 and 26 and/or focus servo means 42 and 28 is detected. When the detected acceleration exceeds preset reference acceleration, data writing is once stopped, and a writing speed is made slow from the stopped address to resume data writing.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]
This invention relates to the data write method to the optical disc for avoiding the write error of data, etc. during the writing of data, and an optical disk unit.
[0002]
[Description of the Prior Art]
It is distorted depending on the optical disc generally marketed, and there are also what is not formed in the perfect circle, and a thing out of which flatness has not come. Since it is not such a perfect circle, or an optical disc will vibrate if the optical disc out of which flatness has not come is rotated with a spindle motor, the writing of exact data may not be made.
In the actual condition which especially writing speed (it is double speed, such as 16X and 24X, and beforehand decided gradually in this specification) has accelerated, since the revolving speed of the optical disc by a spindle motor is rising, in recent years, Even if distortion etc. had arisen slightly in the optical disc, the probability that a write error will occur was high.
[0003]
Therefore, in the optical disk unit in which data write is possible to an optical disc, ATIP which traced once the optical disc with which it was equipped before data write, and was generated during trace By counting the number of times of a CRC error (Absolute Time In Pregroove, Cyclic Redundancy Code), ATIP If it is so that the number of times of a CRC error may become more than prescribed frequency, control of lowering one step of writing speed will have been performed.
ATIP CRC An error is an error produced to the data as address information indicated to an optical disc.
[0004]
[Problem(s) to be Solved by the Invention]
When writing in data by high-speed writing speed, the more writing speed becomes high-speed, the more as for writing operation, it is influenced by the acceleration component of the object lens within an optical pickup.

Therefore, originally it is ATIP. If it becomes clear that acceleration which produces a CRC error arose in the object lens, it is required to lower writing speed immediately and to prevent a write error (write-error). However, in the method which prevents the conventional write error. It is ATIP CRC even if it is a case where acceleration which serves as a write error even if arises in an object lens. Since control which is downed in writing speed is not performed unless generating of an error is more than prescribed frequency, the technical problem that it is easy to generate a write error occurs.
Even if it is a case where writing is [even if] successful, lack arises in the RF signal of the written-in data under the influence of ****** acceleration, and there is also a possibility that the optical disc which is hard to read may be generated in an object lens.
[0005]
In order to prevent a write error, before writing in, tracing an optical pickup is also performed, without actually writing in data, but only the part of time to trace has the technical problem that the whole write time will long-time-ize. And since trace cannot necessarily carry out to the whole disk surface, even if it is a case where it is judged that it will trace and a write error will not be produced, there is also a possibility that a write error may arise after all.
[0006]
Then, the place which this invention is made that an aforementioned problem should be solved and is made into the purpose, It is in providing the data write method to the optical disc to which it is supposed that prevention of a write error is aimed at as writing speed is controlled based on the state where the acceleration within the optical pickup of an object lens was detected and this detected in real time during the writing of data, and an optical disk unit.
[0007]
[Means for Solving the Problem]
When reading data from an optical disc according to a data write method to an optical disc concerning this invention, And an optical pickup which carries out relative displacement along with a pregroove of an optical disc irradiating with a laser beam to an optical disc when writing data in an optical disc, A tracking servo means to make it move within an optical pickup and to control an object lens provided in this optical pickup to follow said pregroove, When writing data in an optical disc using an optical disk unit possessing a focus servo means which is made to move said object lens within an optical pickup so that distance of said object lens and a recording surface of an optical disc may be kept constant, and is controlled, When acceleration at the time of movement within an optical pickup of said object lens is detected and this detected acceleration is over reference acceleration set up beforehand, writing of data is once interrupted, writing speed is made late from a this interrupted address, and writing of data is resumed.
When according to this method among optical discs are distortion etc. and it is not a perfect circle, Or it can detect in data write that acceleration arose in movement within an optical pickup of an object lens, and when flatness has not come out, it is made to make writing speed late so that a write error may not arise in this case. Therefore, even if it is a case where data write by a high speed is performed, prevention of a write error can be aimed at.

[0008]
Said reference acceleration is set up beforehand become a value which differs at given writing speed, respectively.
Therefore, it can set up so that generating of slight acceleration may also make writing speed slow, and generating of a write error can be more certainly prevented, so that writing speed accelerates.
[0009]
A spindle motor which is made to rotate an optical disc according to the optical disk unit which this invention requires for this invention, An optical pickup which carries out relative displacement along with a pregroove of an optical disc irradiating with a laser beam to an optical disc when reading data from an optical disc, and when writing data in an optical disc, A tracking servo means to make it move within an optical pickup and to control an object lens provided in this optical pickup to follow said pregroove, An optical disk unit possessing a focus servo means which makes it move within an optical pickup and controls said object lens to keep constant distance of said object lens and a recording surface of an optical disc is characterized by comprising:
An acceleration detecting means which detects acceleration at the time of movement within an optical pickup of said object lens with a current amount which flows into said tracking servo means and/or said focus servo means.
A judging means which judges whether acceleration at the time of movement within an optical pickup of said object lens detected by this acceleration detecting means is over reference acceleration set up beforehand.
A writing speed control means which controls said spindle motor to make writing speed late when this judging means judges with acceleration detected by an acceleration detecting means being over reference acceleration set up beforehand.

Even if it is a case where among optical discs are distortion etc. by adopting this composition, and flatness has not come out when it is not a perfect circle, It is detectable in data write that acceleration required an object lens within an optical pickup, and if it is more than a size with this constant acceleration, it will be made to make writing speed late so that a write error may not arise. Therefore, even if it is a case where data write by a high speed is performed, prevention of a write error can be aimed at.
[0010]
[Embodiment of the Invention]
Hereafter, the suitable embodiment of this invention is described in detail based on an accompanying drawing.
First, the block diagram about the internal structure of an optical disk unit is shown in drawing 1, and the composition of this embodiment is explained with those operations based on this.
The optical disk unit 30 possesses the optical pickup 19 which has a photodetector (not shown) which receives the catoptric light from a laser diode (not shown) and the optical disc 10 which oscillates the laser beam with which the optical disc 10 is irradiated.
[0011]

The optical pickup 19 is formed in the tracking direction of the optical disc 10 movable by the delivery mechanism 20 to which the optical pickup 19 is moved. The delivery mechanism 20 comprises a thread axis (not shown), a feed motor (not shown), etc. which are supported so that a slide of the optical pickup 19 is possible.

[0012]

The object lens 38 which extracts the laser diode (not shown) which oscillates a laser beam, and the oscillated laser beam to the inside of the optical pickup 19 and with which a track is irradiated is formed. The object lens 38 is supported by the actuator 35 so that it may become movable in a focusing direction (drawing sliding direction) and a tracking direction (drawing longitudinal direction).

[0013]

The tracking coil 40 and the focus coil 42 are formed in the actuator 35, Tailing of the track on the optical disc 10 of the object lens 38 is attained with the tracking coil 40, and distance with the optical disc 10 is kept the object lens 38 constant with the focus coil 42.

Explanation of a concrete structure forms the tracking coil 40 so that the magnetic flux may turn to the diameter direction of the optical disc 10. And it is provided in the outside of the tracking coil 40 so that the permanent magnet which is not illustrated may become movable to the tracking coil 40. This permanent magnet receives the magnetic flux produced with the tracking coil 40, and moves the object lens 38. Therefore, the object lens 38 becomes movable [to the diameter direction of the optical disc 10] within the optical pickup 19 by controlling the current which flows into the tracking coil 40.

The tracking servo control part 26 is connected to the tracking coil 40, and the tracking servo control part 26 controls the current which flows into the tracking coil 40.

[0014]

The focus coil 42 is formed so that it may be suitable in the direction the direction and the magnetic flux cross at right angles to the recording surface of the optical disc 10. It is provided in the upper part of the focus coil 42, or a lower part so that the permanent magnet which is not illustrated may become movable to the focus coil 42. This permanent magnet receives the magnetic flux produced with the focus coil 42, and moves the object lens 38. Therefore, ****** of the object lens 38 becomes possible to the optical disc 10 by controlling the current which flows into the focus coil 42 within the optical pickup 19.

The focus servo control section 28 is connected to the focus coil 42, and the focus servo control section 28 controls the current which flows into the focus coil 42.

[0015]

The tracking coil 40 and the tracking servo control part 26 connected to this correspond to the tracking servo means of a claim, and the focus coil 42 and the focus servo control section 28 connected to this correspond to the focus servo means of a claim.

[0016]

The optical disc 10 is laid on the turntable formed in the axis of rotation of the spindle motor 22, and rotates by the drive of the spindle motor 22.

Rotation of the spindle motor 22 is controlled by the motor servo control section 24. The move servo control

section 32 controls control of the delivery mechanism 20 of the optical pickup 19.
Here, although such each servo control section is illustrated as two or more servo control sections for explanation, it is possible to use the servo processor which comprises one LSI etc. actually.
[0017]
Each servo control sections 24, 26, 28, and 32 mentioned above are controlled by the error signal extracted from the strength signal of catoptric light reflected from the optical disc 10 by the RF amplifier (not shown), and CPU (not shown).
[0018]
The acceleration detecting means 44 is connected to the tracking servo control part 26 and the focus servo control section 28.
The acceleration detecting means 44 can always check the current which the tracking servo control part 26 sends through the tracking coil 40, and the current which the focus servo control section 28 sends through the focus coil 42.
That is, the acceleration detecting means 44 can detect whether acceleration arose in the object lens 38 in the tracking direction or the focusing direction based on the current which the tracking servo control part 26 and the focus servo control section 28 sent. The size of acceleration can also be judged when acceleration is furthermore detected. Suppose the acceleration detecting means 44 actually that the tracking servo control part 26 and the focus servo control section 28 are sampled by turns.
[0019]
The principle which detects that acceleration arose in the object lens 38 is explained.
If the optical disc 10 is not a perfect circle or flatness has not come out, a motion of the object lens 38 which follows the pregroove of an optical disc may also become large, and acceleration may produce it in the object lens 38 in a focusing direction or a tracking direction.
The object lens's 38 carrying out accelerated motion is exactly that the tracking servo control part 26 or the focus servo control section 28 sends current to the tracking coil 44 or the focus coil 42 so that the object lens 38 may carry out such movement.
Therefore, the acceleration detecting means 44 can detect whether acceleration has also produced the object lens 38 with the tracking servo control part 26 or the focus servo control section 28 confirming whether supply the current more than the specified quantity.
[0020]
The judging means 46 which judges whether the size of the acceleration produced in the object lens 38 is the acceleration of the size of the grade which starts a write error is connected to the acceleration detecting means 44.
The judging means 46 reads the reference acceleration which is beforehand set as the memory measure 48 of a hard disk etc., and is memorized, and measures the acceleration and reference acceleration which were actually produced in the object lens 38.
[0021]
The reference acceleration memorized by the memory measure 48 is good to be put in a database so that it

may become a different value at given writing speed. Namely, as shown in Table x shown in drawing 1, if there is acceleration beyond this, acceleration with a possibility that a write error may arise will be set up at given writing speed, respectively.
The judging means 46 chooses the reference acceleration applicable to the present writing speed from Table x, is extracted, and is compared with the measured acceleration.
[0022]
The writing speed control means 50 is connected to the judging means 46.
When the judging means 46 judges with the detected acceleration being larger than the reference acceleration set up beforehand, the writing speed control means 50 controls the motor servo control section 24 and the move servo control section 32 to lower one step of writing speed.
[0023]
Specifically, the acceleration detecting means 44 and the judging means 46 which were mentioned above, and the writing speed control means 50 are realized in the control section which comprises a memory, a CPU, etc. operating based on the control programs (firmware etc.) set up beforehand.
The writing speed as used in the field of this invention is the double speed called 20X and 40X, and is the speed decided beforehand gradually.
[0024]
Next, operation of this invention is explained based on the flow chart of drawing 2.
First, in Step S100, the writing operation of data is started in the write command from the host computer which is not illustrated being inputted.
And in the acceleration detecting means 44, at the following step S102, the tracking servo control part 26 or the focus servo control section 28 to the tracking coil 44 or the focus coil 42. It shifts to the following step S104 noting that acceleration has arisen in the object lens 38, while sending the current of the size more than fixed. The size of concrete acceleration can judge the acceleration detecting means 44 with a current amount.
Here, when not detecting acceleration, it shifts to Step S110.
[0025]
In Step S104, it is judged whether the acceleration from which the judging means 46 was detected by the acceleration detecting means 44 is over reference acceleration. If it is judged that it is not over reference acceleration, it will continue writing as it is, without changing writing speed. If it is over reference acceleration, it will shift to Step S106.
[0026]
The motor servo control section 24 and move servo control section 32 grade are controlled by Step S106 so that the writing speed control means 50 once interrupts data write.
Once data write is interrupted, the motor servo control section 24 and move servo control section 32 grade are controlled by the following step S108 so that the writing speed control means 50 lowers one step of writing speed and resumes the writing of data.
[0027]

It shifts to Step S110 after change of writing speed, and if the writing of data is completed, it will end. When data write has not been completed yet, it returns to Step S102 and it is detected whether acceleration arises further in this writing speed.

[0028]

As for this invention, although the suitable example was given per this invention above and many things were explained, it is needless to say that many can be changed within limits which are not limited to this example and do not deviate from the pneuma of an invention.

[0029]

[Effect of the Invention]

According to the data write method to the optical disc concerning this invention, and the optical disk unit. Even if it is a case where among optical discs are distortion etc., and flatness has not come out when it is not a perfect circle, It can detect in data write that acceleration arose in movement within the optical pickup of an object lens, and it is made to make writing speed late so that a write error may not arise in this case. Therefore, even if it is a case where data write by a high speed is performed, prevention of a write error can be aimed at.

Since the real-time check of this acceleration is carried out into actual data write, the trace before data write becomes unnecessary and can realize shortening of a write time as a whole.

Since the acceleration of the object lens in the whole disk surface will be checked, improvement in the record grace of the data written in as an entire disk can be aimed at.

[Brief Description of the Drawings]

[Drawing 1]It is a block diagram explaining the optical disk unit concerning this invention.

[Drawing 2]It is a flow chart explaining how to write in the data concerning this invention.

[Description of Notations]

10 Optical disc
19 Optical pickup
20 Moving mechanism
22 Spindle motor
24 Motor servo control section
26 Tracking servo control part
28 Focus servo control section
30 Optical disk unit
32 Move servo control section
35 Actuator
38 Object lens
40 Tracking coil
42 Focus coil
44 Acceleration detecting means
46 Judging means

48 Memory measure

50 Speed control means

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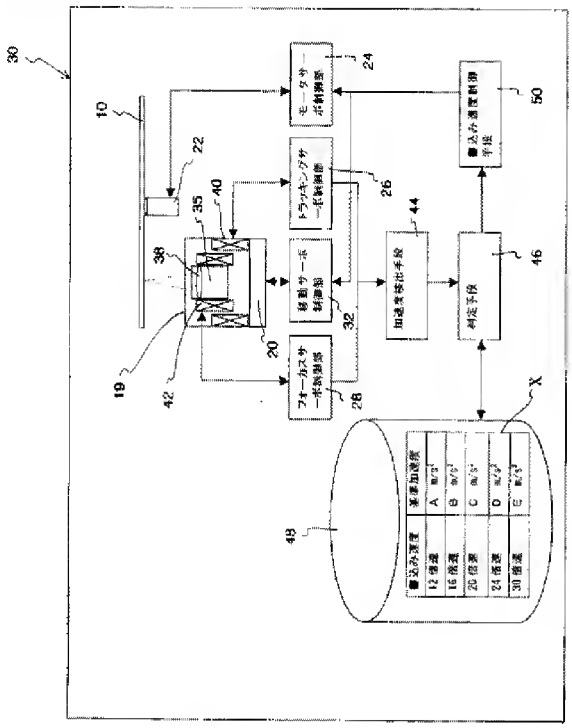
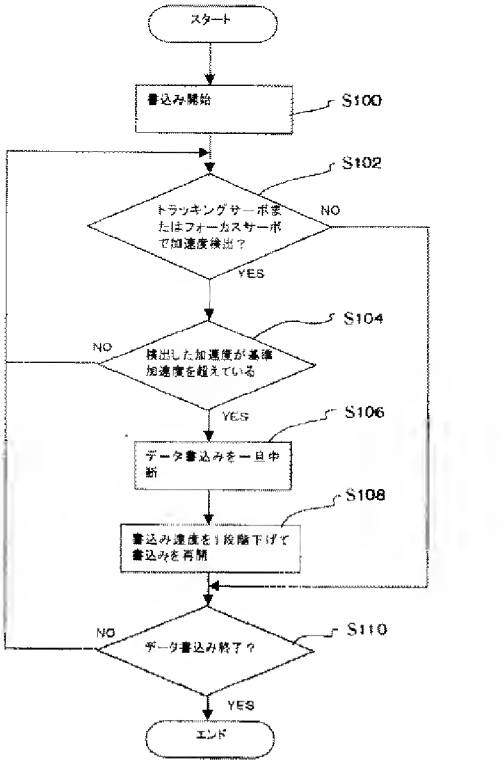
DRAWINGS

[Drawing 1]



[Drawing 2]



[Translation done.]